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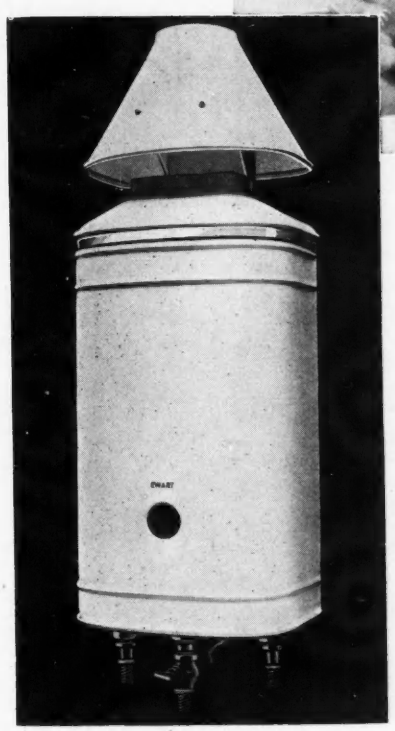
Gas Journal

LIGHT - HEAT - POWER - BY-PRODUCTS

Vol. 235. 93rd Year. LONDON, SEPTEMBER 3, 1941. Registered as a Newspaper No. 4085. Price 1/-



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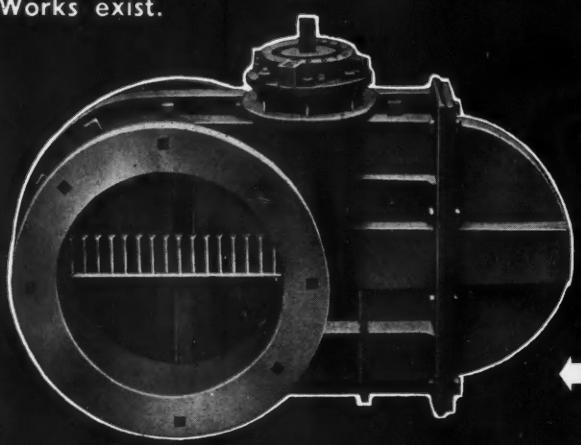

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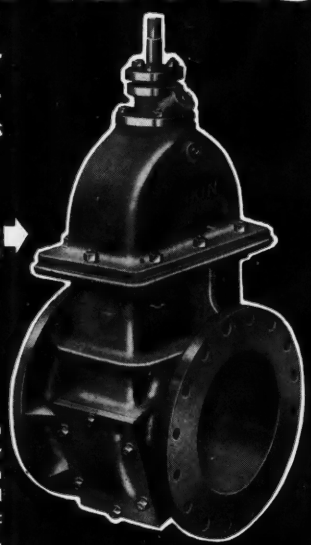

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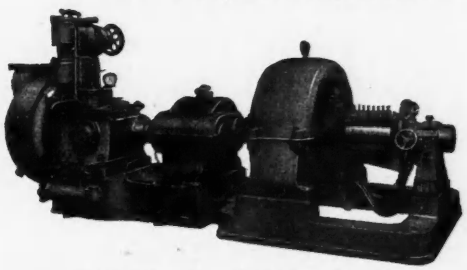

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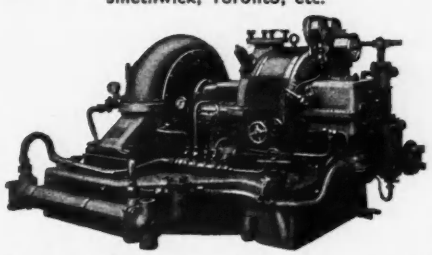

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Sale of Gas Acts, 1859—1901, Gas Regulation Act, 1920, and Regulations thereunder.
GAS METER TESTING OFFICE.
City Road, Newcastle upon Tyne, No. 2.
NAME OF MAKER: J. Glover & Co
DESCRIPTION OF METER. No. OF METER: Maker's 29815 / Company's —
Wet / Dry
Nominal capacity per hour: 30 cubic feet
READING OF INDEX at time of examination: 73,600
I hereby Certify that the above-described Meter was examined and tested on the 17th day of June 1867 in accordance with the provisions of the above Acts and Regulations, and was Stamped
RESULTS OF TESTING.
For accuracy of registration Correct
For internal soundness Correct
Other defects —
Date of Meter 1867
Witness my hand.
TESTING FEE £— 1/—
Wm Taylor Inspector of Meters.
NOTICE—Under the Gas Regulation Act, 1920, suppliers of Gas by means of an Unstamped Meter are liable to a penalty of not exceeding Ten Pounds. It is also provided by the Sale of Gas Act, 1859, that any person using or having an Unstamped Meter in his house is liable to a penalty of Five Pounds.

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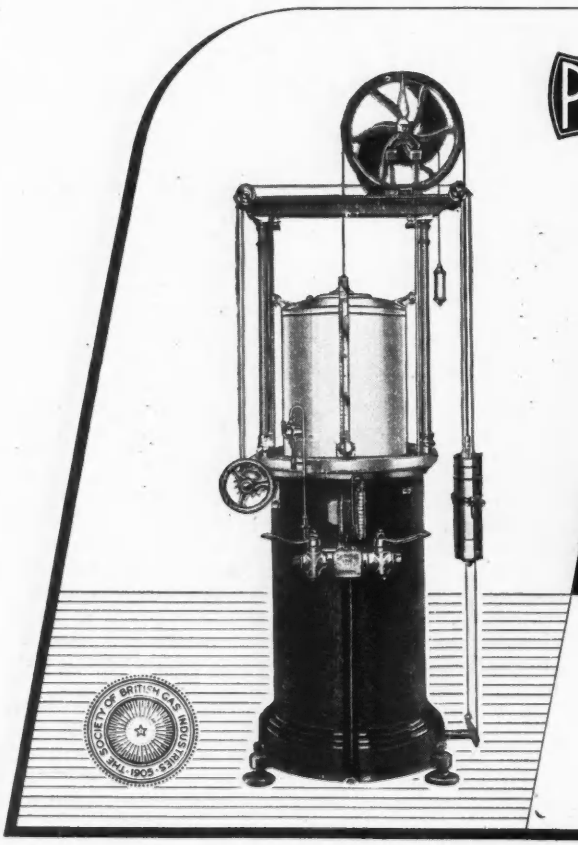

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also at Birmingham and Belfast

P 2

GAS JOURNAL, SEPT. 3, 1941

VOL. 235 93rd YEAR No. 4085

EDITORIAL NOTES

GAS FOR MOTOR TRANSPORT

IN view of the cuts in the supplementary and basic rations of petrol which are to come into force in October next we returned in last week's "JOURNAL" to the subject of the employment of low-pressure gas for motor transport. We did not discuss again the use of high-pressure gas, the development of which is held up owing to the fact that the necessary equipment, both "bottles" and compressors, is not available. Nor is the question of policy regarding low-pressure gas for the purpose at all well defined. The reasons for this are understandable; nevertheless the position needs clarifying. As we said last week, the essential factor in the development of the scheme is adequate supplies of coal to gas undertakings, and, we would add, an authoritative ruling on the general advisability or otherwise of the Gas Industry's going ahead in extending sales of gas for motor transport at a time when the coal situation is so uncertain, rationing of gas "in the air," and the matter of priorities in gas supply so important. In regard to technical equipment there is no difficulty; a year ago the London Gas Development Association agreed upon its standardization and also the standardization of gas price. Since then there has been a growing demand for gas bags—a demand in excess of supply. The problem is not a technical one; it is a matter of policy—with coal as the crux.

The situation to-day is confused. Some undertakings are keen to develop the load, and we think we are right in saying that the Mines Department is most favourably disposed to the use of gas for motor transport in place of imported petrol. Other undertakings are not in any way pushing either this load or any other gas load. Apart from coal supplies, some undertakings are in the position that their available plant is unequal to the demand for gas for the making of munitions; how, then, they ask themselves, should they regard the sale of gas for motor transport. Yet the importance of the availability of motor transport to the life of the community and the prosecution of munition services needs no stressing. Obviously, the greater the restrictions placed upon petrol rations, the more vital is the use of gas as a substitute; and so we come back to the problem of priorities in gas consumption.

We have not mentioned the incidence of air raid damage on the supply of gas for motor transport and the formulation of a defined policy in regard to it. Since the London Gas Development Association announced its plans at the end of September of last year there has been considerable experience of broken gas mains resulting from enemy air attack. On some occasions, as is well known, some small sections in the areas of certain gas undertakings have for a short time—considering the conditions very short indeed, surprisingly short—been without a gas supply. And we have heard it argued that housewives in the sections concerned would, when temporarily without a gas supply for cooking, heating, or the provision of hot water, look askance at motor vehicles running merrily with a gas bag attachment. To our mind this argument is very weak. If the Gas Industry, irrespective of blitzes, finds itself still in a position to render possible the movement of essential motor services—it may be the delivery of food or of clean clothes from the laundry—it is definitely performing a most useful service to the public, and very likely to the inhabitants of the districts temporarily without a gas supply for normal domestic purposes. We know of instances where the gas bags on gas undertaking vehicles have been deliberately deflated because of fear of adverse public opinion, which action appears to us irreconcilable with the Industry's aim of service.

So we are momentarily left with this peculiar and unsatisfactory position regarding the supply of gas in substitution for petrol for motor transport. "Substitution" hardly expresses what we have in mind; the use of gas, as we have emphasized throughout when discussing the matter, makes possible the employment of vehicles which would otherwise be idle. It seems to us that what is needed is common agreement within the Gas Industry, and agreement as an Industry with the Mines Department, as to the desirability of the gas traction load in its relation to other calls upon gas service for domestic, industrial, and strictly munition needs. What, in fact, is the place of this load in any order of priorities? Our view is that there is too great a temptation, too great a tendency, to claim priority for particular gas services when these very services are bound up with general gas usage over an extremely wide and varied field. In "general gas usage" we include without hesitation the movement of essential transport. The crux of the whole problem, we may well repeat, is adequate coal supplies to cope with increased and increasing demands for gaseous fuel. But this does not render any less necessary an agreed apportionment of the gas it is possible to make to those purposes which will in aggregate have the best all-round beneficial result. And in this regard we think that the Government Departments concerned should state clearly their wishes and expectations, taking the necessary steps to see that they can be implemented—which, in brief, means the assurance of coal supplies to the Gas Industry in quantity far greater than is being delivered at the present time with the winter fast approaching.

SCIENTISTS IN INDUSTRY

THE influence of science on national life was the subject taken by Sir Robert Pickard for the Address he delivered recently on the presentation of the Medal of the Society of Chemical Industry. He spoke of the change which has taken place since the last war in the employment of scientifically trained men in industry. The modern trend towards standardization, simplification, and reduction of types with consequential increase of reliance by users on specification has led to a great increase in the employment of persons who have received some scientific training, and the tendency to amalgamation of small units has led to the greater employment of chemists, since the larger unit can afford better equipped laboratories and larger and better qualified scientific and industrial staffs than smaller concerns. In industry in general, and this applies to the Gas Industry, far fewer physicists than chemists are employed. We have said on several previous occasions that our Industry needs physicists as well as chemists. Throughout the process of gas manufacture physical as well as chemical and mechanical considerations must be borne in mind, and the same is true of gas utilization. Referring to gas supply, the Author remarked that its purity is now taken as a matter of course by everyone in the British Isles, yet it has only resulted from the continuous application of science. The striking advances in recent years in the celerity of transport and communications form the most often quoted examples in the use of science, but those in the production of fuel pass as commonplace and are hardly realized to-day by the man in the street.

Sir Robert Pickard deprecated the sharp distinction between those whose time is mainly occupied with day-to-day investigations and process control, and those occupied with fundamental long-rage research. The results of the former class of worker are capable of immediate application, so that it is true that most industries and firms would at the present day soon cease to operate in the absence of this class and would not suffer for some little time by the dismissal of the "long-range"

research worker. "An occasional problem in the large scientific organization of to-day is to arouse and then satisfy the latent curiosity of the former class about the current programme of the long-range research worker and to eradicate the mental arrogance which is often displayed by the research worker, with contempt for the more conventional efforts of his not less important colleagues." We were interested, too, in the Author's observations on research associations. The results attained by research associations which concentrate on fundamental work and mental work are more quickly applied by the large concerns with their own private research organizations, while the smaller firms gain scientific guidance at a very small cost well within their means. The success of the research associations—and some are very successful—is in Sir Robert's opinion due to the institution of their "development" or "liaison" departments staffed by those who can interpret the laboratory results in the language of the mill, workshop, or perhaps equally or more important in the language of the office or manager's room. How often, the Author added, does one read in reports recommendations for the establishment of a comprehensive research organization containing phrases such as "the Head should be a distinguished man of science of proved administrative and organizing capacity."

In his opinion the appointment of a distinguished scientific expert as the head of a large research (or other scientific) organization can only be a success if that expert on appointments is prepared to cease to function as an expert. "By all means let him, having the urge, continue to illumine his narrow field of personal work, but only as a pastime. This may often be a real sacrifice by the research worker, not compensated by the material increase in emoluments of the administrator as compared with those of the working scientist. His job as the head of an organization is to spur on the efforts of his colleagues, to smooth their way, and to interpret, if need be, these efforts to those who provide the resources of the laboratories."

Anthracite as Water Gas Fuel

The Director of Minerals Industries Research at the Pennsylvania State College, Mr. A. W. Gauger, has sent us a copy of Bulletin 31, entitled "The Resistance of Anthracite to Mechanical and Thermal Shock." It is a report of some of the results obtained in a research programme sponsored by the Commonwealth of Pennnsylvania and the Anthracite Institute. The programme consists of two projects. One of these relates to the study of the use of large sizes of anthracite for the generation of water gas. The second is concerned with the manufacture of active carbon from anthracite. In the course of the study of the first project it became apparent that a laboratory study of the behaviour of anthracite on exposure to high temperatures had first to be investigated; and the bulletin shows the results of this investigation. During the past year successful experiments have been carried out in two city gas plants. We are informed that the results of these experiments will be reported in two subsequent bulletins.

Before initiation of any experimental work a field survey was made to determine those properties and characteristics of anthracite which are of major importance to the water gas industry. Many plants were visited and water gas operators interviewed. Several plants in Pennsylvania were found to be using anthracite regularly as generator fuel with excellent results and several operators were found who considered anthracite to be a superior fuel for this purpose. Other operators were found, however, who questioned the ability of anthracites to withstand satisfactorily the combination of thermal and mechanical shock to which a fuel is subjected in a modern water gas plant. As a result of this survey, it was decided that a study should be made of the mechanical and thermal stability of a variety of anthracites in an endeavour to clarify the situation with respect to possible decrepitation of this fuel in a water gas generator. Although several other phases of the water gas project are being investigated, including full-scale tests in plants using both the light and heavy oil processes, Bulletin 31 deals primarily with studies which have been completed on the stability of anthracite under conditions of shock comparable to those experienced by generator fuel.

The data presented show that decrepitation due to thermal and mechanical shock combined is not in most instances a serious factor in water gas sets operating under normal conditions. Clinker resistance appeared to be a much more important factor in influencing overall resistance. For the majority of plants which now operate at blast rates equal to or lower than the rated normal of 197 cu.ft. per minute per square foot of grate area, the majority of the anthracite tested would, it is concluded, give little or no trouble from decrepitation.

The Salvage Drive

The Controller of Salvage at the Ministry of Supply has written asking us to call attention to the great salvage drive which is being undertaken by the Salvage Department in collaboration with the various local authorities comprising the Greater London Region. He asks us to mention particularly the urgent need for waste paper of every type. In most businesses, gas undertakings being no exception, it frequently happens that quantities of old correspondence files, price lists, labels, wrappings, cartons, posters, and display material accumulate over many years, which for one reason or another have become obsolete. The Country needs that material, and needs it now. The Salvage Controller appeals to those closely concerned with such supplies to instruct their staffs to go through any stocks of paper or card, and their old records, to see how much can be turned over to salvage. Nothing is too little—the paper of one old envelope will make a cartridge wad—and the Country wants it all. We are informed that since the war enough waste paper alone has been recovered to fill a string of lorries stretching from London to Glasgow—over 370,000 tons. The supply line must carry on.

Bibliography on National Defence

With the assistance of the Librarians of the Consolidated Edison Company of New York and of the Public Service Electric and Gas Company, the Librarian of the American Gas Association has compiled a most comprehensive bibliography on national defence and air raid precautions for public utility undertakings. Since the war started, committees of the Technical Section of the American Gas Association have been noting information on the subject from a great variety of sources, and the bibliography, which was published in the A.G.A. *Monthly* for July–August, should prove of much value. Another bibliography is in course of preparation which will deal with utilization and some of the more general matters relating to national defence not included in the scope of air raid precautions. Organized A.G.A. committees are making every effort to have well prepared plans ready for any emergency. An extensive questionnaire covering all phases of the operating problems connected with the defence programme has been circulated, and already 70% of the American Gas Industry has replied.

Personal

The impending retirement of Mr. J. D. SMITH, Engineer Manager, and Secretary of the Belfast Gas Undertaking, has evoked a special resolution from the civic Gas Committee which has recommended that the resignation be received with regret, and that the Committee place on record their appreciation of the outstanding manner in which Mr. Smith had discharged his onerous duties for upwards of 31 years.

"The Belfast Gas Undertaking, which is one of the most efficient and modern in the Kingdom, is," the resolution goes on, "a tribute to Mr. Smith's vision, judgment, and energy, and its financial success, with consequent benefit to the community, is in a large measure due to his business acumen."

The Committee extended to Mr. Smith every good wish for health and happiness in his well-earned leisure.

* * *

Mr. HORACE LONG, F.C.I.S., Secretary and Accountant of the East Surrey Gas Company, retires from that position at the end of February, 1942, when he will have completed 41 years' service as Accountant and 35 years as Secretary. He joined the Company in the year 1889. He will be succeeded by Mr. C. M. HEMSLEY, A.S.A.A., until recently Secretary of the Ilfracombe Gas Company and, since the outbreak of war, Acting Secretary of Associated Gas and Water Undertakings, Ltd.

* * *

Mr. S. E. R. WYNNE, Press Officer, British Commercial Gas Association, who was seconded shortly after the outbreak of war to undertake similar duties at the Ministry of Supply, has been promoted. His present title in the Ministry is Assistant Controller of Building Construction, and he is engaged on a special piece of work called for by the Minister, Lord Beaverbrook.

* * *

Last week members of the staff and workmen of the Newport (Mon.) Gas Company met in the Company's Board Room to honour three colleagues, Messrs. R. M. JONES, H. E. JONES, and C. COLLINS, upon the completion of over 60, 50, and 51 years' service with the Company. Mr. R. S. Snelling (General Manager and Secretary) presided, and was supported by Mr. R. Wilson Bartlett, J.P., Mr. C. O. Lloyd, and Mr. J. H. Canning, J.P. (Directors), and Mr. J. F. Rust (Engineer). In making presentations Mr. Canning said a great deal of the success of the Company was due to the way in which the recipients had carried out their work in dealing with the public.

* * *

The marriage took place on Aug. 30 at Holy Trinity Church, Tulse Hill, S.W. 2, of Captain W. J. LIBERTY, R.A.F. (ret.), and Ada, sister of Mr. and Mrs. Gravett, of West Norwood, S.E. 27.

Obituary

Engineer-Captain Fraser Shaw

Engineer-Captain FRASER SHAW, whose death we have announced in the "JOURNAL," was present at the battle of the Falkland Islands and was promoted to the rank of Engineer Commander for distinguished service.

During his career in the Navy he specialized in the burning of fuel and was responsible for courses of instruction on oil fuel and turbines. Towards the end of the Great War he acted as liaison officer with the Ministry of Munitions (Mineral Oil Production Department), which brought him into close touch with practically every type of carbonization plant designed to treat indigenous material for the production of oil.

He was then seconded to the Department of Scientific and Industrial Research for duty at the Fuel Research Station and in 1922 he retired from the Navy with the rank of Engineer Captain and was appointed Chief Engineer of the Station. The wide experience he had gained on fuels was of great value in the investigations carried out at the Station, and he was especially interested in the development of plants for low temperature carbonization. In association with Dr. King he read a Paper before The Institution of Gas Engineers upon "Recent Experiments at the Fuel Research Station upon the Production of Solid Smokeless Fuel," for which the Authors received the Gold Medal of the Institution. In 1935 he described in a Technical Paper the low temperature carbonization plant which had been evolved largely under his supervision. He published a second Paper on this subject in 1939. He was also concerned in all methods of heating and heat transfer. He was largely responsible for organizing the tests carried out on low temperature carbonization plants. It is not possible in this short note to enumerate the investigations in which he played an important rôle, but every programme owed much to his wide knowledge. One of his particular interests was to devise methods for the precise measurement and control of large scale units.

He endeared himself to the Staff of the Station by his enthusiasm and by the help he offered so freely. He gave every credit to his assistants, and he carried this idea so far that he refused to have his name associated with many publications in the preparation of which he had played a prominent part.

* * *

Mr. ROBERT BROWN, for 27 years Manager of the Catrine Gas-Works, Ayrshire, who retired last December, has died, aged 71. Under his supervision the plant was renewed and improved, and the production greatly increased. He was previously employed at the Mauchline Gas-Works.

Awards for Gallantry

The King has given orders for the following awards for brave conduct in civil defence:

M.B.E.

C. R. Wilkin, Manchester Gas Department.
J. E. Wakeford, Salford Gas Department.

British Empire Medal

H. Waters, Salford Gas Department.
A. E. Dodson, C. Johnson, T. B. Stapleton, and A. A. Tomlinson, Gas Light and Coke Company.

1941 "Journal" Directory

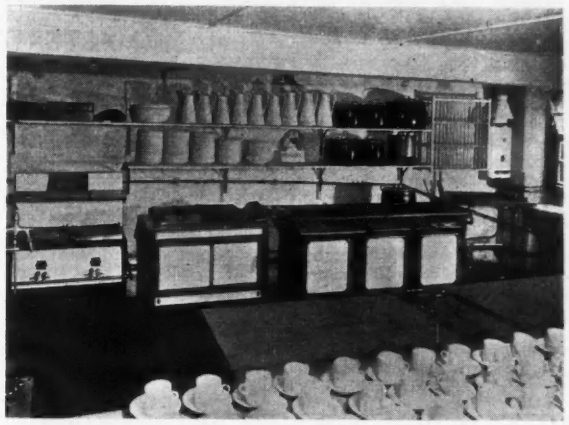
The following changes should be noted in order to keep the Directory up to date:

Page 2. AMBLE. A. Murray, M.
„ 26. FARNHAM. A. E. Logsdon, MD.
„ 30. GRAVESEND. O. R. S. Ingham, Act. E. & M.
„ 34. HORNCASTLE. T. W. Dodds, Jr., E. & M., *vice* T. W. Dodds, retiring Sept. 30.
„ 36. ILFRACOMBE. C. M. Hemsley relinquishes Secretaryship.
„ 42. LIVERPOOL. C. R. Leach, S. & Tr., *vice* J. Sandon Stubbs, retiring Sept. 30.
„ 78. WORKINGTON. J. G. Pope, E. & M., *vice* Hedley Hoy, retiring Oct. 31.
„ 124. MELBOURNE. R. C. Evans, GM., J. I. Crane, S., C. F. Broadhead resigns Engineership on appointment as MD. to Colonial Gas Association (page 123).
„ 129. PRIMITIVA. E. P. Stevenson retired.

The Summer Issue of *Fanfare* includes the Sixth Annual Report of the Women's Gas Council in full. The magazine also contains many of the features which have made it so popular in the past, among which is an interesting account of the Services Club organized by the Grimsby Branch.

A Meeting of the Central Executive Board of the National Gas Council will be held in Committee Room 1, Gas Industry House, 1, Grosvenor Place, London, S.W. 1, on Tuesday, Sept. 9, at 12.30 p.m., to be followed by the Central Committee of the Federation of Gas Employers.

Factory Canteen for 600 Workers



Our illustration shows a portion of a canteen kitchen equipped by a local Gas Company, with apparatus manufactured and supplied by Radiation Ltd. This factory is engaged upon important work for the Government, and the canteen is used by 600 employees. No fewer than 140 cooked dinners are provided at each sitting, while an average of from 1,500–1,800 cups of tea are provided daily. The apparatus shown on the photograph includes a No. 617 "Chester" three-oven range, a double pan "Causeway" fish fryer, and a small "Warrington" hotcloset.

Investigation of Atmospheric Pollution

The annual report of the D.S.I.R. for the year ended March 31, 1940, is not to be published in the usual way, but the following is a summary of the report of the Superintendent of Observations.

The number of instruments maintained by the Co-operating Bodies during the year were: Deposit gauges, 127; automatic filters, 11; volumetric sulphur apparatus, 12; and lead peroxide apparatus, 60. At the outbreak of war (which occurred nearly in the middle of the period under review), observations with a number of instruments were discontinued, most of them temporarily. Some measurements for the year are therefore incomplete. The results obtained with the deposit gauges as summarized by the figures for total solids deposited can be compared with the previous year:

Class.	Total solids. 1938/39.	1939/40.
A	26	31
B	72	69
C	1	0
D	0	0

This shows that there are more stations in the current year where the deposit falls into Class A than in the previous year—that is to say, the deposit over the whole country, as represented by these deposit gauges, has decreased. This continues the improving trend. The highest total deposit measured for the year (395 tons per square mile) was in Manchester, while the lowest measured (57 tons per square mile) was at Loggerheads; both places, however, show smaller deposits than in the previous year.

There were only three complete sets of results with automatic filters, Cardiff, Coventry, and Stoke-on-Trent. These are not sufficient to provide a basis for comparison with the previous year. The average monthly suspended impurity does, however, show interesting characteristics, notably maxima, in January, 1940, which it will be remembered was unusually cold. This increase in suspended impurity was no doubt due to an increase in all forms of domestic heating during the cold period despite the shortage of fuel in some districts. All three places show a sharp increase in suspended impurity in October, followed by a minimum in November, although the average temperature for that month was lower than the average for the past fifty years or so. It may be that the continuation of "summer-time" till Nov. 20, 1939, and the restriction on the combustion of fuel imposed by the fuel rationing scheme may be responsible to some extent for these minima in November.

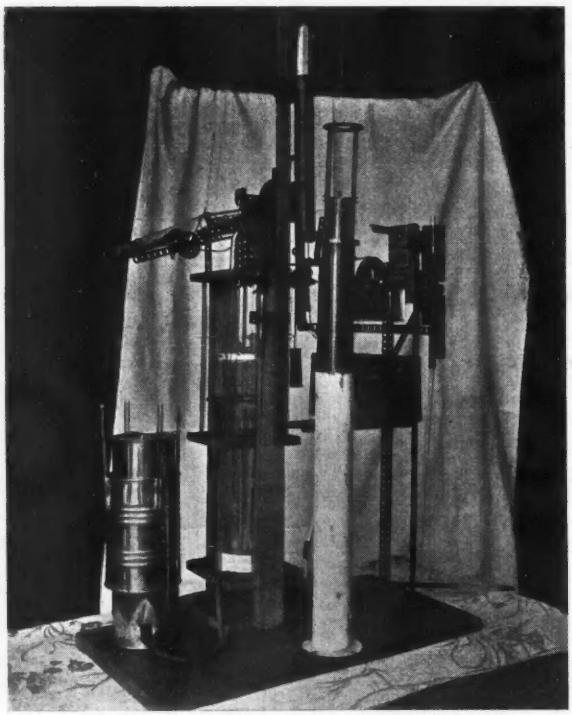
Complete results for the measurement of the concentration of sulphur dioxide by the volumetric method were obtained from the stations at London (Beckton and Crossness), Salford, and Sheffield. The averages from these stations are slightly lower than those for the previous year. The measurement of sulphur gases by the lead-peroxide method does not show any unusual features.

An Attractive Window Display, stressing the value of Britain's wartime harvest, was staged in the Queen's Road showrooms of the Hastings and St. Leonards Gas Company. Against a background of golden sheaves of corn the various processes of flour-making were illustrated up to the crowning point when a beautifully baked loaf was seen in the act of being removed from one of the latest types of gas oven.

AN IMPROVED RECORDING GAS CALORIMETER*

By WILLIAM MASTERTON, B.Sc.Tech., Edinburgh

THE science of recording gas calorimetry—it deserves the description of a "science" since it has been the study of so many specialized workers—was founded by Professor Junkers when he designed the first recording calorimeter. He laid the foundations of recording calorimetry so well that his instrument—albeit in modernized form—is the chief instrument used in Germany to this day. His successors in the science—a galaxy of well-known names—Boys (Britain), Thomas and Parr (U.S.A.), Stewart, Fairweather, and Simmance—seem to have divided the problem into two phases, some attacking one phase and some the other. Some seem to have said, "We must have a recording calorimeter which will duplicate as near as possible the results of the manually performed test, no matter what it costs." Others have said, "The smaller works must have some rough idea what they are doing in calorific value." The two classes of recorder following from their divergent viewpoints are officially recognized under the terms "scientific" and "inferential."



The whole problem of designing an instrument of the highest accuracy and reliability at a price to meet the pocket of the smaller works does not appear to have been within the power of any previous designer. Yet this is accomplished in the instrument I am about to describe.

I have a model which is home-made and necessarily a bit crude. Nevertheless, it is full size and it works. It did not cost much to make—not more than £5, the price of the Boys calorimeter, of course, not included. A professionally made one would cost much more, but it would be cheaper than those of even the inferential types, particularly as the cheapness of the inferential types is in part fictitious, since a complete manual outfit in addition to them has to be provided for checking purposes.

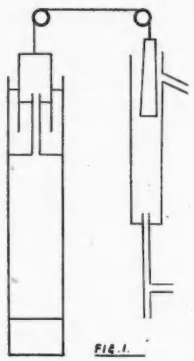
This instrument is a development from the recording calorimeter which I had the pleasure of describing to you in 1934. When I was working on that earlier instrument I had plans for a new departure in experimental gas meters, but initial difficulties were met with, and I considered it better to complete the calorimeter as a whole, without my own meter, but using the usual type of experimental meter. In this respect it was nothing inferior to the others which use the same type of meter. I intended, after I should have brought the calorimeter as a whole to completion and got it commercially launched, to return to my own meter, work it out, and incorporate it in the instrument. Well, although I brought the instrument to completion, and showed every component of it working, it was never commercially launched.

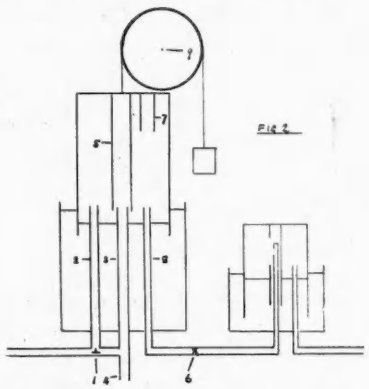
My instrument is unique, at least as far as British practice is concerned, in that there is no provision of any means to adjust its capacity. Once it is made right it is always right. Its capacity does not depend upon the water level in it, but on the dimensions of the glassware of which it is made. I have always held that an experimental meter for the continuous measurement of gas should be, as volumetric glassware for the measurement of liquids is, capable of being made correct once and for all. Experimental meters, as we know them, are adjustable to a levelling pointer, which is set by a "bridge" or gauge. The original accuracy of this setting is of the order of 0.1%. But the meter must be checked, not only by its own gauge quarterly, but also annually by meter-proving bottle. The latter is only a rough check. If the proving by bridge is found to be as much as 0.5% wrong by bottle, the fact must be reported to the Board of Trade Gas Testing Section with a view to having the meter seen to. That is to say, the proving by bridge is normally accurate to 0.1%, but you have at no time a guarantee that the error is not something approaching 0.5%. Moreover, when a meter is used on a recorder there is often, over a period, a small gain or loss of water (even though pre-saturation is practised), and in this way the meter capacity contributes its quota to the necessity of an "interval correction."

This meter is like a litre flask, which is a litre flask from the day the N.P.L. certify it to the day it gets broken.

General Principles of the Recorder

The gas meter consists in a gasholder of special design rising and falling alternately. The water is supplied from a vessel, fig. 1, which is fitted with a 3-way tap at the bottom. In one position of the tap





water fills the vessel to overflowing, and in the other position of the tap the vessel discharges its contents to pass via an anti-fluctuator to the calorimeter. The capacity of this water-measuring vessel is modified by a wedge-shaped sinker hung in it and partly immersed when the vessel is full. The deeper the wedge hangs in the water vessel the less its effective capacity. The depth at which the wedge hangs is controlled by a small gasholder bell which contains a fixed volume of air. Thus the prevailing tabular number modifies the flow of water. The mechanism that works the 3-way tap of the water vessel is the same as that which works the valves of the gas meter, and so the gas and tabular controlled water supply are kept in step.

This water-measuring device bears some resemblance to that of the Burgess-Parr calorimeter, an American instrument. I desire to state, however, that (1) my designing of it was entirely original (I was unaware of the design of the Burgess-Parr at the time I designed my own water measure), (2) that, while I recognize that such a statement has no value from the patenting point of view, my instrument is sufficiently different from the water measure of the Burgess-Parr as not to constitute an infringement of it. It is in several particulars superior. The Burgess-Parr uses gas-filled metallic wafers to give the prevailing gas volume—I prefer the simpler arrangement of a gasholder bell, which is always more accurate and reliable than are aneroids. The aneroids of the Burgess-Parr recorder require a system of gears and levers to magnify the movement. The movement of my gasholder bell is sufficiently open not to require any magnification, and the connexion from tabular bell to sinker in water measure is simply a thread over a pulley. In my experience of floats in other types of instrument I find they occasionally develop leaks—a fault which cannot occur in a sinker of solid metal.

The temperature rise is recorded by the same thermometer as I employed in my previous calorimeter, with the difference that a special provision is made to exclude the possibility of dust getting at the mercury. The thermometer consisted of two needles coupled together, each descending its respective thermometer bore. When the needle in the outlet thermometer contacted the mercury in the stem a circuit was completed, which circuit was broken by the later contacting of the needle in the inlet thermometer with its mercury. Thus, in the period between the two contactings, a current was flowing. This excited an electro-magnet for the same period, and, as the magnet

* Paper to the Scottish Junior Gas Association (Eastern District).

was rotating in sympathy with the needle, the armature (which carried the pen) was moved a distance which measured the temperature rise and therefore the calorific value.

The Gas Meter

This is of extremely simple design (fig. 2). The gasholder part and the tank containing it are of glass—a material that neither warps nor corrodes. One can see exactly what is happening inside.

The 3-way tap (1) is turned so that all ways are open. The holder rises as gas enters by tubes (2) and (3). Some gas escapes by (4) to a burner which is fitted with a pilot light. When the holder nears the top of its stroke the bottom end of tube (5) rises out of the water. When the holder reaches the top of stroke the 3-way tap (1) closes (all ways) and the holder falls till the bottom of the tube (5) contacts the water surface, the excess gas having passed out by (4). Once the central tube (5) contacts water surface a measured volume of gas is trapped in the holder. After a little delay, valve (6) is opened and the holder falls, expelling measured gas until tube (7) covering tube (8) contacts the water surface and the doling out of measured gas has ceased. After a little delay valve (6) closes and (1) opens (all ways) to recommence the cycle.

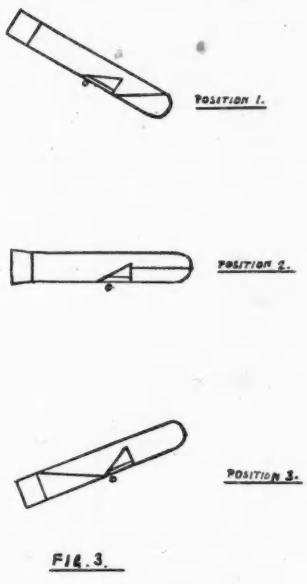


FIG. 3.

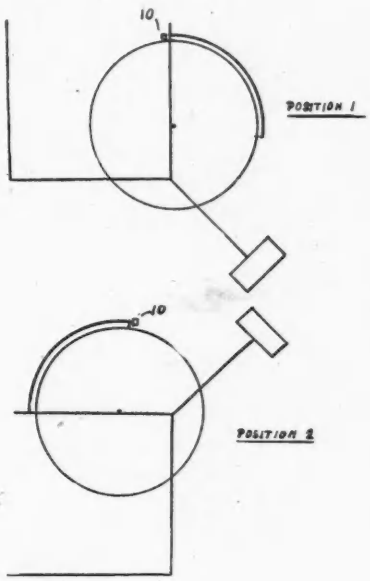


FIG. 4.

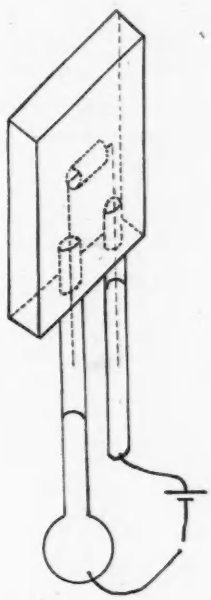


FIG. 6

The capacity of this meter is obviously unaffected by the water level in the tank. It depends on the difference in level between the bottom ends of tubes (5) and (7), and, as these are fixtures, so is the capacity. This meter should cut out the necessity of periodic meter proving. It is readily dismantled and easily accessible for cleaning.

The meter discharges into an anti-fluctuator which consists of a small gasholder fitted with an inlet valve which shuts off against the meter when the anti-fluctuator holder attains a certain height. In this way when the small holder has risen to its highest point it refuses to accept the greater pressure thrown by the meter, the descent of which now takes place more slowly. When the meter grounds, the anti-fluctuator holder still throwing its own pressure continues to feed the calorimeter burner until the meter is ready to discharge gas again.

Operating Mechanism

The mechanism has to do much.

(1) A little after the gas meter grounds it has to close (6) and open 3-way tap (1) and turn water vessel 3-way tap.

(2) When the gas meter reaches the top of the stroke close 3-way tap (1) and turn water vessel tap.

(3) A little after the lower end of tube (5) has contacted water surface, open tap (6).

You will notice that in two cases an action has to take place "a little after" some other action. This necessitates the use of some form of delay action, and the one I have designed is shown in fig. 3.

A test tube has a wedge-shaped piece of sealing-wax sweated on inside it. Through the sealing-wax passes a narrow glass tube lying along the bottom of the wedge adjacent to the wall of the test tube. There is water in the test tube, which is mounted on a pivot. When the test tube is in position (1) the water is at the closed end. When the test tube is brought to the horizontal—which is the furthest round the action of the gas meter can bring it—the water slowly flows through the glass tube in the wedge to the corked end. The balance is upset and the tube tips to position (3) and thereby carries out the delay action required. Once the meter gets under way again a projection from the axle (9) of the meter engages a projection on the axle of the test tube and puts the test tube back to position (1).

The power to operate the valves is obtained from a water-tipping bucket (fig. 4). When empty the position of repose of the bucket is as in (1). When filling with water the bucket tries to tip to position (2) but cannot do so on account of the end of a lever (10) against the raised rim of the wheel. When the meter reaches the top of the stroke, (10) is raised and bucket tips to position (2), when the meter, now falling, releases the lever which engages the raised rim of the wheel at the other end and prevents the bucket righting itself until "permission" has been given by the delay action falling on the other end of lever (10) on completion of the downstroke of the meter.

This action of the tipping bucket taking place at the top of the meter stroke, and after a short delay at the bottom, serves to open and close 3-way tap (1) and water vessel tap, and to close tap (6), but it does not open tap (6), which must be done only after a measured volume of gas has been trapped in the meter.

The opening of (6) is accomplished by another and heavier delay-action test tube which operates only on the downstroke of the meter, after the meter has got to a position where the lower end of the tube (5) has contacted the water surface.

When the meter is in this position the delay action tube is brought to horizontal and after delay it falls and sweeps open valve (6). The fall of the meter is then resumed and results in the test tube being brought back to normal. The test tube does not perform its delay action on the upstroke of the meter because at that time the meter is rising and the delay action has not time to operate before it is past the "danger" point. But on the way down when the measured gas is trapped the meter actually ceases descending and waits till the delay action test tube functions.

Automatic Gas Sampling

While this does not exactly come under the heading of our present subject I will digress a little to suggest an automatic gas sampler, because the mechanism of it is similar to some of that just described.

The most reliable method of gas sampling is that in which a small meter is geared to a station meter, but this is not generally possible, and the following description gives a method which is in no way inferior and is generally applicable. A small gasholder (11), fig. 5, in actuality a test tube, is placed under the roof of an annular gasholder (12) which contains a sealed-up volume of air and acts as a tabular control on the height to which the test tube holder can rise.

A governed gas flow is brought on to the test tube via a 3-way tap. The tabular control is weighted to throw the same pressure as the governed gas flow. The test tube rises. On coming against the roof it remains up until the 3-way tap is turned to discharge the gas from the test tube holder to a large holder throwing a lesser pressure. The 3-way tap is turned backwards and forwards by a tipping bucket similar to that already described, the only difference being that the lever controlling it is operated by electro-magnet, the impulse coming from a clock, if sampling is to be on a time basis, and from a station meter, if on a volume basis. The twenty-seventh Report of the Joint Research Committee (1930) on the Back-Run Process for C.W.G. stated: "In taking a sample either for analysis or for the determination

of the amount of undecomposed steam true average figures will only be obtained if the rate of sampling varies directly as the rate of production of the gas to be sampled. It was impracticable to devise an apparatus which would permit of such sampling, and during the test

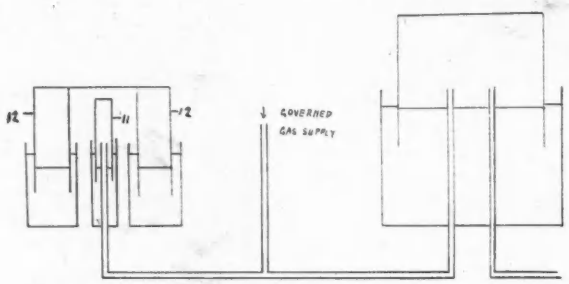


FIG. 5

all samples were taken at a constant rate." This apparatus gives a method of solving the problem. If the electric impulse controlling the tipping bucket's operation comes from a meter on the gas flow, the rate of sampling will vary directly as the rate of production of the gas. I recognize that in many cases—indeed in most cases—it will not be practicable to have a meter of the station-meter type on the gas flow, but a simple inferential flow meter can be installed and its reading translated into electric impulses at the correct rate. To effect this a clock can be made to operate the contact-making arrangement, the drive being through a variable gear, the setting of which is controlled by the position of the flow-meter indicator. Such a gas sampler would be in frequent use in many gas researches, and I pass the suggestion on to any whom it may concern.

Recording Thermometer

This is a modernized version of the thermometer of the 1934 instrument. The mechanical electrical device functioned correctly in the earlier calorimeter, but there was the disadvantage that the bores of the thermometers being open to the atmosphere to allow of the action of the descending needles, the mercury became dirty. Mercury becomes dirty and ineffective on the slightest excuse, and the success or failure of the whole thermometric arrangement will be decided on whether or not we can arrange totally to enclose it.

It is often amazing, after one has grappled with a problem, how simple the real solution may be. The thermometer (mercury in glass), fig. 6, open at top is placed alongside a glass tube containing mercury and likewise open at top. The two are hermetically sealed into the bottom end of a long flat box with a glass front and back. A needle bent as shown dips into both bores while a roller of soft iron surrounds the horizontal part of the needle. An external magnet moving up and down pulls the roller (and needles) after it. When the needle contacts mercury in the thermometer a circuit is completed. I offer this instrument to the Gas Industry.

THE DESIGN AND LAYOUT OF A RECONSTRUCTED GAS-WORKS*

By F. B. WALLER, *Alloa*

(*Continued from p.* 325)

It is also important that the detarrer should be placed after the condensers, as the light oils from vertical retorts are in vapour phase prior to the condensers and would therefore not be extracted by the electro-detarrer. These light oils are usually found to be very persistent, and give trouble in the purifiers and the benzole washing plant. If, however, the detarrer is at the outlet of the exhausters, they are in the liquid state and are at this position consequently removed.

Several tests carried out on the gas stream before and after treatment show that the plant has an efficiency of 99.7%. The Pexton tube method was used, and showed 163 grains per 100 cu.ft. at inlet and only 0.6 grains at the outlet of the treater.

The attached figures are running costs over one week's run—Dec. 1 to 7, 1937.

Gas treated—cu.ft.	Running hours.	Steam consumption—lb.	Steam cost at 6d. per 1,000 lb.	Engine Oil.	Total Running charges.	Running costs. Per million cu.ft.	Per 1,000 cu.ft.
7,540,200	168	16,800	8/5d.	3/6d.	11/11d.	1/7d.	0.019d.
Running costs on full capacity—*i.e.*, 2 million cu.ft./diam.						10¼d.	0.010d.

New Purification Plant

The existing four boxes, converted from water seal to dry lute in August, 1935, were fully taxed during the winters of 1935/36 and 1936/37, when the daily load was fast approaching 1 million cu.ft.

The cubic content of oxide of iron in the four boxes was 5,600, and allowing, say, 7 cu.ft. of oxide per 1,000 cu.ft. of gas to be purified, the capacity of the plant only equalled 800,000 cu.ft. per day, or, taking a figure of 30 cu.ft. per million cu.ft. of gas made per annum (Davidson), the capacity was suitable for a make of approximately 200 million cu.ft. per annum. This necessitated frequent changes of the oxide in the boxes, which was further made necessary due to the fouling of the oxide by tar fog prior to the installation of the detarrer plant.

Purification costs for the years 1936 and 1937 were £140 and £150 respectively, representing a figure of 0.14d. and 0.12d. per 1,000 cu.ft. of gas made, or 1s. 2d. and 1s. per 100,000 cu.ft. of gas purified. These figures are too high, if one can take as a criterion of good purification results the figures of Dr. G. W. Anderson.

It was therefore decided, in order to provide purifying plant capable of dealing with the increased make of gas and to allow a sufficient surplus for future developments, such as the acquisition of the Alva Gas Undertaking with an annual make of 40 million cu.ft., to increase the purifying plant by 1½ million cu.ft.

Simplicity in filling and emptying of the boxes was one of the main essentials required, as any economics that could be carried out in these processes, which are heavy items in purification costs, would reduce the manufacturing cost of the gas into the holder.

Facilities as regards the proposed site were ideal, there being sufficient room adjoining the existing purifier house for an additional four boxes, which in themselves would equal a capacity of 2½ million cu.ft. per diem. It was, however, decided to provide only 2 boxes, leaving room for the remainder at some future date. These two boxes, with a total content of 8,640 cu.ft., are able to deal with 1,250,000 cu.ft. per diem, and this when using ordinary oxide of iron.

Mr. C. G. Pearson, in his Paper "Notes on Purification" read before The Institution of Gas Engineers in 1929, states that 6.6 cu.ft. of oxide of iron per 1,000 cu.ft. of gas should be available in the case of active oxide, but that 7.7 cu.ft. of oxide per 1,000 cu.ft. of gas should be provided in the case of ordinary oxide.

Each box is provided with inlet and outlet reversing valves, and the practice of reversing the flow of gas after fortnightly periods has been found to be very beneficial in reducing the amount of back-pressure thrown by each box. As soon as the pressure is observed to mount up in one direction of flow of gas the flow is reversed, and this has the effect of opening up the partially caked oxide. This method also, of course, results in the oxide of iron, when the time comes, being thoroughly spent from top to bottom. Thus full use is taken of the oxide with a minimum of changes.

The temperature of the gas is maintained by means of a steam heater fixed between the inlet working valve and reversing valve to each box. The heaters are of modern design, giving a high rate of heat transfer from steam to gas, and are constructed entirely of special cast iron so as to resist corrosion. The heaters are for use with exhaust or live steam as desired.

Continuous Vertical Retort Installation

In considering the installation of a new vertical retort bench, found necessary in view of increased output and the recent purchase of the Alva Gas Undertaking, with an output of 40 million cu.ft. per annum, the following are the main features which were required to meet these demands and for the economic manufacture of gas.

(1) Maximum daily output of 2 million cu.ft. of gas of calorific value of 440 B.Th.U. with benzole extraction, with a thermal yield of 82 therms per ton of coal carbonized.
(2) Producers to be capable of burning the maximum amount of coke breeze.
(3) Waste heat from bench to be utilized for steam generation.
(4) The plant to be complete with coal, coke, and breeze handling plant, the existing G.B. conveyor to be adapted for coal and breeze handling from existing breaker pit.
(5) Residual coke to be elevated to existing coke storage hopper.
(6) The whole plant to be housed in a suitable building of attractive and distinctive design.
(7) Duplicate pumps and motors to be installed, also alternative means of coal and residual coke handling to be incorporated in case of breakdown.

The foregoing requirements were all included in the continuous vertical installation as put forward by the Woodall-Duckham Vertical Retort and Oven Construction Co. (1920) Ltd., whose quotation was finally accepted.

The new Woodall Duckham installation consists of one bench containing the latest type upwardly-heated W-D continuous vertical retorts, 14 in number, and is capable of carbonizing 100 tons of coal and producing 1¾ million cu.ft. of 460 B.Th.U. gas per day. The plant is provided with complete coal and coke handling plant and

(*Continued on p. 370*)

* From a Paper to the Scottish Junior Gas Association (Eastern District).

Gas Products Prices

The London Market

Sept. 1.

No changes are to be recorded in the prices of Coal Tar Products in the London market and they remain at approximately the following levels:

Pitch nominal; creosote 4¾d. to 5d.; refined tar 3¾d. to 4d.; pure toluene under the Ministry of Supply Toluene No. 2 Order 2s. 5d.; pure benzole 1s. 10d.; 95/160 solvent naphtha 2s. 5d. to 2s. 8d., and 90/160 pyridine 13s. 6d.; all per gallon naked; refined crystal naphthalene £23 per ton in bags; all *ex* Makers' Works.

The Provinces

Sept. 1.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 1s. 10d. (controlled by the Control of Toluene No. 2 Order, July 5, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 10d. to 11d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha North, 1s. 6d. to 1s. 7½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4½d. to 4¾d.; Scotland, 4½d. to 4¾d.; low gravity, 4½d. to 4¾d. Fuel Grade, 4d. to 4¼d. Carbolic acid, 60's, 3s. 7½d. to 3s. 9d. Naphthalene, £12 to £15. Salts, 70s. to 80s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal. Heavy oil: Unfiltered anthracene oil (min. gr. 1,080), 5¼d. to 5½d.; filtered heavy oil (min. gr. 1,080), 5¾d. to 6d.; heavy anthracene oil gr. less than 1,080, 6d. to 6¼d.

*In regard to pitch and crude tar prices we would ask readers to refer to the editorial note in our issue of Sept. 4, 1940, p. 404.

Tar Products in Scotland

GLASGOW, Aug. 30.

No material alteration in values can be recorded and deliveries are proceeding quite rapidly.

Refined tar is in fair call at fixed price of 4¾d. to 5d. per gallon for delivery in the home market. Export value is round 3¼d. per gallon, both f.o.r. naked.

Creosote oil: Production finds ready outlets as follows: Specification oil, 5¾d. to 6d. per gallon; low gravity, 6¼d. to 7d. per gallon; neutral oil, 6d. to 6½d.; per gallon; all *ex* Works in bulk.

Cresylic acid: Supplies are not readily procurable at present and prices are firm as under: Pale, 99/100%, 3s. 9d. to 4s. per gallon; Pale, 97/99%, 3s. 5d. to 3s. 8d. per gallon; Dark, 97/99%, 3s. to 3s. 3d. per gallon; all *ex* Works in buyers' packages.

Crude naphtha shows no change at 6¼d. to 7¼d. per gallon *ex* Works in bulk, according to quality.

Solvent naphtha: 90/160 grade is 1s. 8½d. to to 1s. 9d. per gallon and 90/190 Heavy Naphtha is 1s. 4½d. to 1s. 5½d. per gallon.

Pyridines are still quiet at round 14s. per gallon for 90/160 grade and 16s. per gallon for 90/140 grade.

Shrewsbury Gas Company's Accounts for the twelve months ended June 30 last show that the profit on Revenue Account is practically the same as that for the preceding year, at £16,767. Co-partnership bonus, &c., amounts to £1,319. In the Reserve Fund Account is included an item "Appreciation of Investment, £177."

The Usual Dividend at the rate of 8% per annum is being paid by the Cork Gas Consumers' Company for the half-year ended June 30. The balance at Profit and Loss for this period is £3,801. As compared with that for the corresponding half of the previous year, the Revenue Account shows an increase in cost of coals, and in the returns from sales of gas and residuals.

The Selkirk Gas Company have submitted accounts showing a profit for the year ended April 30 of £1,438. A dividend for the twelve months at the rate of 4¾%, free of income-tax, compares with the payment of 5¾% for the previous year. Towards the dividend now decided upon, an interim payment of 2½% was made in January last.

The Bedford and District Private Fire Brigades' Association held their Annual Fire Competition on Aug. 9. The eighteen works brigades belonging to the Association employ over 300 firemen. In the motor-trailer pump drill W. H. Allen, Sons & Co., Ltd., and the Bedford District Gas Company drew in the finals, but after a re-run the first-named team were the victors. In the Senior Division of the two-men hydrant drill, four-men hose-cart drill, and five-men hydrant drill the Gas Company were awarded first place, as also in the Junior Division of the motor-trailer pump drill.

The 9th Meeting of the Domestic Heating Committee of The Institution of Gas Engineers will be held at 1, Grosvenor Place, London, S.W. 1, on Tuesday, Sept. 16, at 2 p.m.

Mr. R. Wilson Bartlett, a Director of the Newport Gas Company, presided at the annual allotments, gardens, produce, and flower competitions at Crindau, and was supported by Mr. C. O. Lloyd and Mr. J. H. Canning (Directors), Mr. R. S. Snelling (General Manager and Secretary), and Mr. J. F. Rust (Engineer). The competitions promoted by the Company were extended. Mr. E. W. Studley (Newport Parks Superintendent) congratulated the Company on the splendid co-operative effort they were making to produce food. The allotments, he said, were among the finest in the town.

Solutions of some of the many small difficulties that crop up in the kitchen of even the most experienced housewife are given in the new leaflet "Nothing Up My Sleeve" published by the Women's Gas Council. The typescript of this latest addition to the "I Pass This On To You" series has been shown to several experienced cooks and has been warmly welcomed.

A **Meeting** of the National Federation of Gas Coke Associations will be held on Tuesday, Sept. 9, at Gas Industry House. General Committee, 10.45 a.m.

A.R.P.
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METRO CREOSOTE EMULSION
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GAS STOCKS AND SHARES

After the dullness of the previous week markets opened more cheerfully, sentiment being favourably affected by the Prime Minister's speech and the news from Iran. Gilt-edged securities on the whole remained firm throughout, although 2½% Consols closed ¼ lower at 81¾. The industrial section was generally firm, tobacco and stores shares being good features. Home rails, which opened firmly, suffered a set-back in the middle of the week, but any losses were speedily recovered after the announcement of the Government's agreement. Leading oil shares displayed a strong tone, Anglo-Iranian ordinary reaching the highest price this year. Rubber and tea shares remained in a state of neglect.

The volume of business in the Gas Market was not quite so heavy last week and, in contrast to the general trend of rising prices which has been a noticeable feature for the past few weeks, quotations on the whole showed little change. A set-back occurred in Gas Light units which closed 1s. 3d. lower at 13s., the recent announcement with regard to interim dividends doubtless being a contributory factor. On the other hand, however, Severn Valley Gas Corporation £1 shares closed 1s. higher, and on the Provincial Exchanges both Bristol and Weston-super-Mare ordinaries advanced 2 points. The Directors of the South Suburban Gas Company have declared an interim dividend of 2 per cent., the same rate as a year ago. It will be remembered that this company distributed 3% for the full year 1940.

Quotations on the London and Provincial Stock Exchanges

OFFICIAL LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Aug. 28.	Rise or Fall on week.
1,767,439	March 10	7	6	Alliance & Dublin Ord. ...	85—90	...
374,000	June 30	4	4	Do. 4 p.c. Deb. ...	90—95	...
957,608	May 5	5	5	Asscd. Gas & Water U'd'ts Ord.	13/—14/-	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	14/—16/-	...
535,545	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	14/—16/-	...
336,646	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	9/6—11/6	...
561,370	Aug. 18	7	7	Barnet Ord. 7 p.c.	112—117	...
300,000	June 3	1/4⅛	1/9⅜	Bombay, Ltd.	19/—21/-	...
690,407	Aug. 25	7	7	Bournemouth 7 p.c. max. ...	120—125*	...
362,025	June 16	4	4	Do. 4 p.c. Deb. ...	90—95	...
659,955	March 3	4⅜	2½	Brighton, &c., 5 p.c. Con. ...	55—65	−2½
855,000	March 10	6	6	Brit. Gas Light Ord.	68—73	...
545,000	June 16	5½	5½	Do. 5½ p.c. 'B' Cum. Pref	105—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb.	75—80	...
10,000	Nov. 6 '33	6	4	Cape Town, Ltd., 4½ p.c. Cu. Pf.	¼—¾	...
626,860	July 21	6	6	Cardiff Con. Ord.	86—91	...
24,500	May 5	7	7	Colombo 7 p.c. Pref.	18/6—19/6	...
764,169	March 24	-/11.48	-/11.48	Colonial Gas Assn. Ltd. Ord. ...	14/—16/-	...
400,000	,,	1/3.30	1/3.30	Do. 8 p.c. Pref. ...	19/—21/-	...
1,748,935	July 22 '40	2	3	Commercial Ord.	27—32	...
620,000	June 9	3	3	Do. 3 p.c. Deb.	55—60	...
286,344	Aug. 18	5	5	Do. 5 p.c. Deb.	87—92	...
807,560	,,	6	6	Croydon sliding scale	85—90	...
644,590	,,	5	5	Do. max. div.	80—85	...
620,385	Dec. 30	5	5	Do. 5 p.c. Perp. Deb. ...	95—100	...
179,500	Feb. 10	5	5	East Surrey 'B,' 5 p.c.	65—70	...
176,461	June 16	5	5	Do. 5 p.c. Deb. (Irred.)...	90—95	...
250,000	July 14	4	6	Gas Consolidation Ord. 'B' ...	13/6—14/6	...
250,000	May 12	4	4	Do. 4 p.c. Red. Cum. Pref.	14/6—16/6	...
19,122,910	July 29 '40	3⅜	4⅛	Gas Light & Coke Ord. ...	12/6—13/6a	−1/3
2,600,000	,,	3½	3½	Do. 3½ p.c. max.	50—55	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	62—67	...
2,993,000	July 8 '40	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	66—71	...
8,602,497	June 3	3	3	Do. 3 p.c. Con. Deb. ...	73—78	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	103—106	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	101—104	...
700,000	March 10	3½	3½	Do. 3½ Red. Deb. ...	80—85	...
3,600,000	May 13 '40	4	8	Imperial Continental Cap. ...	63—68	...
43,820	July 28	3½	3½	Do. 3½ p.c. Red. Deb. ...	75—80*	...
231,978	Aug. 25	5	5	M.S. Utility 'C' Cons.	68—73*	...
918,657	,,	4	4	4 p.c. Cons. Pref.	73—78*	...
675,000	May 5	†4	†4	Montevideo, Ltd.	54—59	+1
300,000	April 28	9	7	Oriental, Ltd.	119—124	...
368,537	Dec. 9	8	6½	Plymouth & Stonehouse 5 p.c.	65—70	...
621,667	Feb. 3	7½	7½	Portsmouth & Gosport Cons.	88—93	...
648,999	May 12	1/1	1/1⅛	Severn Val. Gas Cor. Ld. Ord.	15/—17/-	+1/-
597,972	March 10	-/10⅝	-/10⅝	Do. 4½ p.c. Cum. Pref. ...	16/—18/-	...
2,528,714	Aug. 25	1/-	7½	South East'n Gas Cn. Ld. Ord.	11/—13/-*	...
1,000,000	,,	-/10⅜	-/10⅜	Do. 4½ p.c. Red. Cum. Pref.	14/6—16/6*	...
1,068,869	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	11/6—13/6*	...
6,709,895	Aug. 5 '40	4	4	South Met. Ord.	52—57	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	75—80	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	57—62	...
1,895,445	July 14	3	3	Do. 3 p.c. Perp. Deb. ...	68—73	...
1,000,000	Jan. 15	5	5	Do. 5 p.c. Red. Deb. ...	99—104	...
1,543,795	Feb. 24	4	2	South Suburban Ord. 5 p.c ...	59—64	...
512,825	,,	5	5	Do. 5 p.c. Perp. Pref. ...	72—77	...
500,000	,,	4	4	Do. 4 p.c. Perp. Pref. ...	63—68	...
250,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	79—84	...
888,587	June 16	5	5	Do. 5 p.c. Perp. Deb. ...	95—100	...
750,541	Aug. 18	5	2	Southampton Ord.	50—55	...
350,000	,,	5½	5½	Swansea 5½ p.c. Red. Pref. ...	88—93	...
1,076,495	,,	5	5	Tottenham & District Ord. ...	70—75	...
338,555	,,	5	5	Do. 5 p.c. Pref.	78—83	...
453,380	June 9	4	4	Do. 4 p.c. Perp. Deb. ...	79—84	...
1,247,505	May 20 '40	4	6	U. Kingdom Gas Cor. Ord. ...	12/6—14/6	+—/6
1,085,952	May 19	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	13/6—15/6	...
772,709	,,	4	4	Do. 4 p.c. 1st Red. Cum.Pref.	13/—15/-	...
745,263	June 16	4½	4½	Do. 4½ p.c. 2nd Non.Cum. Pf.	10/6—12/6	...
1,200,000	March 17	3½	3½	Do. 3½ p.c. Red. Deb. ...	84—89	...
380,606	April 15	7	6⅜	Uxbridge, &c., 5 p.c.	80—90	...
1,371,138	April 7	4	4	Wandsworth Consolidated ...	67—72	...
2,525,768	,,	4	4	Do. 4 p.c. Pref.	65—70	...
1,243,964	June 16	5	5	Do. 5 p.c. Deb.	97—102	...
382,745	,,	4	4	Do. 4 p.c. Deb.	77—82	...
888,342	Aug. 25	5	5	Watford & St. Albans Ord. ...	85—90	...
300,000	June 9	3½	3½	Do. 3½ p.c. Red. Deb. ...	84—89	...

SUPPLEMENTARY LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Aug. 28.	Rise or Fall on week
351,685	June 16	5	5	Brighton, &c., 5 p.c. Perp. Deb.	88—93	...
28,700	,,	5½	5½	Do. 5½ p.c. Red. Deb. 1942 ...	95—100	...
415,250	,,	4	4	Bristol Gas Co., 4 p.c. New Deb.	87—92	...
140,205	Aug. 5	7	7	Cambridge, &c., 7 p.c. Cons. 'B'	100—105	...
295,932	March 3	5	5	Cheltenham, 5 p.c. Cons.Ord....	85—90	...
42,500	June 16	4	4	Do. 4 p.c. Perp. Deb....	75—80	...
150,000	Aug. 11	4	4	Croydon Gas, 4 p.c. Pref. (Irr.)	68—73	...
130,000	June 30	4	4	Do. 4 p.c. Deb. ...	75—80	...
146,700	Aug. 18	5½	5½	East Surrey, 5½ p.c. Pref. 'A' ...	85—90	...
53,220	,, 10	6	6	Do. 6 p.c. Cum. Pref. ...	90—100	...
...	Aug. 19 '40	6	4	Eastbourne, 'B' 3½ p.c.... ...	35—40	..
239,135	July 14	5	5	Gas Consolidation 'A' Ord. (£1)	11/6—13/6	...
156,600	Aug. 18	5	5	Hampton C't, 5 p.c. Cons. Ord.	67—72	...
18,000	June 30	3½	5½	Malta & Med'n., 7 p.c. 1st Pref.	50—60	...
10,845	,, 2	3½	3½	Do. 7½ p.c. 2nd Pref.	40—50	...
50,000	Aug. 25	£5 19 6	£5 4 6	Mid. South. Util., 'A' Cons. 5 p.c.	60—70*	...
65,000	Aug. 18	5	5	North Middlesex, 5 p.c. Pref....	75—80	...
70,000	March 10	5	5	Plymouth & Stone., 5 p.c. Deb.	83—88	..
76,501	June 30	4	4	Reading, 4 p.c. Perp. Deb. ...	70—75	...
74,777	March 31	4	4	Romford, 4 p.c. Debs. (Reg.) ...	77—82	...
21,000	June 9	5	5	Slough, 5 p.c. Perp. Deb. ...	87—92	...
211,740	,, 16	5	5	Southampton, 5 p.c. Red. Deb.	95—100	...
363,575	July 1	5	5	Tottenham, 5 p.c. Reg. Red. Mt.	97—102	...
202,019	April 15	6⅜	6⅜	Tunbridge Wells, 4 p.c. Scale ...	70—80	...
135,257	June 9	5	5	Uxbridge &c., 5 p.c. Perp. Deb.	95—100	...

PROVINCIAL EXCHANGES

					Quotations Aug. 21.	
804,948	July 28	5	5	Bath Cons.	93—97	...
122,577	March 10	7	6	Blyth 5 p.c. Ord.	100—105	...
1,667,250	July 21	5	5	Bristol, 5 p.c. max.	86½—88½	+2
120,420	June 16	4	4	Do. 1st 4 p.c. Deb.	94—96	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	91—94	...
328,790	,,	5	5	Do. 5 p.c. Deb.	110½—113½	...
157,150	Aug. 5	6½	5	Chester 5 p.c. Ord.	96½—99¼	...
92,500	June 16	4	4	Do. 4 p.c. Pref.	78—80	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	78—80	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	92—96	...
542,270	Feb. 10	6	9	Derby Cons.	98—103	...
55,000	Dec. 16	4	4	Do. 4 p.c. Deb.	75—80	...
10,000	Aug. 11	10	10	Great Grimsby 'A' Ord. ...	155—165	...
6,500	,,	10	10	Do. 'B' Ord. ...	155—165	...
79,000	,,	10	10	Do. 'C' Ord. ...	145—155	...
732,000	Feb. 24	4	4	Hartlepool G. & W. Cn. & New	61—63	...
2,167,410	Aug. 18	6	6	iverpool 5 p.c. Ord.	92—94	+1
245,500	June 16	5	5	Do. 5 p.c. Red. Pref. ...	96½—99½	...
306,083	July 15	4	4	Do. 4 p.c. Deb.	94—99	...
20,000	Dec. 23	5	5	Long Eaton 5 p.c. Pref.	9—11	...
80,000	,,	5	5	Do. 5 p.c. Deb.	87—92	...
2,430,267	July 28	5⅜	5	Newcastle and Gateshead Con.	17/6—18/6a	...
682,856	,,	4	4	Do. 4 p.c. Pref.	81—82	...
776,706	June 30	3½	3½	Do. 3½ p.c. Deb.	82—84	...
277,285	April 28	5	5	Do. 5 p.c. Deb. '43 ...	100—102	...
274,000	March 17	5	5	Newport (Mon.) Ord.	86—89	...
13,200	Sept. 16	8⅝	7	Pontyp'l Gas & W. 10 p.c. 'A'	11½—12½	...
13,600	,,	6	5	Do. 7 p.c. 'B'	9½—10½	...
40,000	,,	5	6	Do. 7 p.c. 'C'	9½—10½	...
106,280	Aug. 11	10	10	Preston 'A' 10 p.c.	155—165	...
188,219	,,	7	7	Do. 'B' 7 p.c.	113—123	...
1,806,339	Feb. 24	6½	6½	Sheffield Cons.	109—111	...
95,000	July 7	4	4	Do. 4 p.c. Deb.	94—97	...
332,351	Feb. 3	6	6	Sunderland 6 p.c. max. ...	107—110	...
192,150	Aug. 11	5	5	Weston-super-Mare Cons. ...	80—85	+2
64,338	June 30	4	4	Do. 4 p.c. Deb.	80—85	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	135—140	...

a.—The quotation is per £1 of Stock. * Ex. div. † Price free of income-tax.

OCT 2 194

waste-heat steam boiler. The installation has been designed so as to be readily extended, by the addition of four retorts. The retort house and the whole of the auxiliary plant is capable of dealing with 2 million cu.ft. of gas daily. The present consumption of gas per day is equal to fully 1¼ million cu.ft.

The retorts are about 25 ft. high, rectangular in plan. They are 62 in. long and 10 in. wide at the top, and are of silica brick. An air-cooled division wall is built between each pair of retorts and the next pair, so as to divide the bench into seven separate units, which can be heated up, scurfed, or let down without interfering in any way with the working of the other retorts.

The combustion of the heating gases takes place in an upward instead of a downward direction. This permits a zoning of heats. This system of heating is simple to put into operation, and to control. When the heats have once been regulated, only the producer gas and waste gas dampers need adjustment.

To supply the gas for heating the retorts, three producers are provided at the retort house floor level at one side of the bench. The producers are so arranged that any producer may be shut down without interfering in any way with the working of the other producers. The gas from any of the producers may be taken to any of the retorts. The producers are of the step-grate type, and are constructed with ample grate area for the efficient heating of a finally completed bench of 18 retorts when using a mixture of half coke and half breeze.

The producers are being effectively worked on a mixture of 50% coke nuts of ¾ in. to 1⅛ in. and 50% coke breeze with 35% below ⅜ in. size.

The step-grate eliminates the need for clinkering. The only attention required to keep the producer fire in proper condition is a periodical pricking up at intervals of eight hours, dependent on the class of fuel used.

It was noted that the average vertical expansion from cold to working temperature over the bench was 3.5 in., while the vertical contraction of two retorts which were let down to cold after four months, in order to save producer fuel, was only 1 in., this being due to the after-expansion of the silica portion of the retorts.

The building is of pleasing and attractive design. It will look modern in appearance many years hence.

The waste-heat boiler, which is of the Cochran-Kirke horizontal "Sinuflo" induced draught type, is designed for a working pressure of 120 lb. per sq. in. It is of a size to deal with the whole of the waste gases from the 14 retorts. In order that the boiler may give its maximum output, if at any time some of the retorts are not in operation, provision is made so that a supplementary supply of producer gas can be mixed with the waste gases before they are passed to the boiler, a supplementary combustion flue being provided. With all 14 retorts in operation the boiler is guaranteed to generate 4,700 lb. of steam per hour from feed water at 60°F. to steam at 120 lb. per sq.-in. pressure, without augmentation of producer gases, and leaving for other than retort house purposes a surplus of 900 lb. per hour. The guarantee has been fully maintained, and with an evaporation of 5.35 lb. of steam per lb. of dry ash-free coke from and at 212°F. and this without taking into consideration the feed water heater.

The following figures show the operating results for week ending 6 a.m. Saturday, Dec. 18, 1937, compared with the guaranteed figures when carbonizing Blairhall Washed Nuts.

	Guarantee.	*Actual Test.*
	Making gas at 460. B.Th.U. per cu.ft.	*Week-end* 6.xii.37.
1. Throughput of coal per Retort per 24 hours—not less than	6.95	7.10
2. Amount of gas (corrected to 60°F. and 30 in. mercury) made per ton of coal carbonized. Not less than—cu.ft.	17.870	18.036
Therms	82.20	82.96
3. Amount of dry coke used as fuel in the producers per 100 lb. of coal carbonized, when all retorts are working, shall not be more than—lb.	13.00	12.40

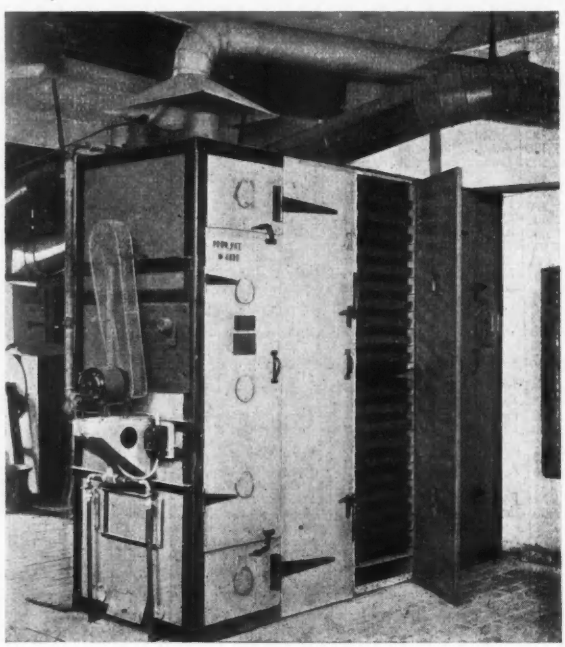
NEW DRYING SYSTEM

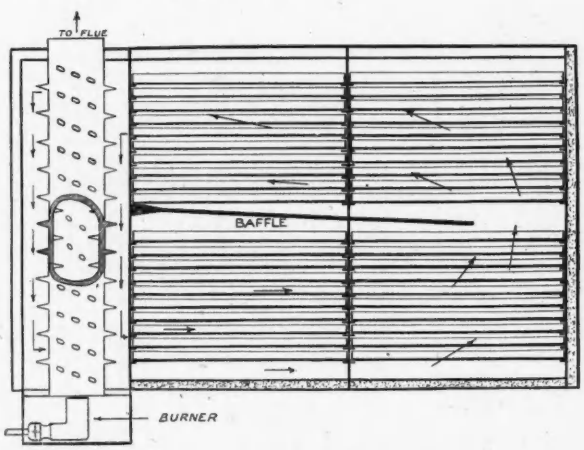
THE need for accuracy in temperature control is important in nearly all drying operations, and particularly when dealing with fine chemicals and colours which may be affected by excessive temperatures or prolonged heating. In order to overcome these difficulties a drying cabinet with many novel features has been designed and patented. The principle may be applied not only to independent dryers but also to continuous conveyor type dryers, and is equally efficacious whether used for solids or liquids.

The cabinet illustrated is constructed in heavy gauge sheet steel and efficiently insulated. On the left of the cabinet is the heating chamber from which a stream of clean hot air is passed into the drying sections. In the photograph two sections are shown, each provided with twenty trays, approximately 2 in. deep, in which the material to be dried is placed.

Mounted on the side of the heating chamber is an electrically driven fan which circulates the air, drawing it from the drying sections and passing it around the heat transfer tubes in the heating chamber. Controllable air inlets are provided in the doors and top of the drying sections, and in the side of the heating chamber, whereby it is possible to recirculate the heated air, or a mixture of preheated air and clean air, or entirely freshly heated air as required.

As shown in the diagram the air passes into the top of the heating chamber and downwards towards the inlet to the drying section, therefore the stream of air is in contact with the hottest part of the heating unit immediately prior to entering the heating section, and no difficulty is experienced in obtaining an air temperature of 600°F. A baffle in the drying section, set at an angle which compensates for the reduction in air volume as the temperature decreases, prevents the heated air short-circulating to the outlet, and additional direction to the air stream is given by the trays.





The heat transfer tubes, of which there are two, are heavy castings with internal and external projections to give speedier heating. Each is provided with a low-pressure gas burner with independent control.

Automatic temperature control can be effected either by a thermostat operated by the temperature inside the drying section, or through the medium of a temperature control fitted in the flue outlet which can be set for any pre-determined flue gas temperature and increases or decreases the gas to the burner in accordance with any fall or rise in the temperature of the flue gases.

Tests on materials containing approximately 50% moisture show that the drying period can be halved. With materials having less water content the saving is even greater, with a corresponding reduction in heating costs.